

REMARKS/ARGUMENTS

Favorable reconsideration of this application, as presently amended and in light of the following discussion, is respectfully requested.

Claims 7-12 are currently pending, Claims 1-6 having been canceled by way of the present amendment and Claims 7-12 having been added by the present amendment.

In the outstanding Office Action Claims 1-6 were provisionally rejected under obviousness-type double patenting as being unpatentable over Claims 1-10 of copending Application No. 09/950,779; Claims 1-3 were rejected under 35 U.S.C. §102(e) as being anticipated by Stentz et al. (U.S. Patent No. 6,136,636, hereinafter Stentz); and Claims 4-6 were rejected under 35 U.S.C. §103(a) as being unpatentable over Stentz in view of Kerfoot, III et al. (U.S. Patent No. 6,320,884, hereinafter Kerfoot).

Claims 7-12 are directed toward the same subject matter as Claims 1-6. Thus, support for Claims 7-12 is found in original Claims 1-6, for example, and therefore the addition of Claims 7-12 is not believed to raise an issue of new matter.

Applicants respectfully traverse the double patenting rejection. The present application is a divisional application that has Application No. 09/950,779 as its parent. The present divisional application was filed in response to a restriction requirement mailed on March 14, 2003. Original claims 1-6 of the present application correspond to the unelected Claims 5-10 of the parent application. In the application, Applicants' traversed the restriction requirement, but the election requirement was made final (see attachment). 35 U.S.C. §121 and MPEP §804.01 prohibit the use of a patent issuing on an application with respect to which a requirement for restriction has been made as a reference against any divisional application. Despite Applicants having traversed the restriction requirement, the Office made

the restriction requirement final. Therefore, Applicants respectfully request that the double patenting rejection be withdrawn.

Turning now to the rejection of Claim 1 (now replaced by Claim 7) as being anticipated by Stentz, Applicants respectfully submit that Stentz does not disclose every element of new Claim 7.

Stentz discloses an optical communication system that uses multiple higher-order (e.g. second-order) Raman amplifiers.¹ The second order Raman pump 20B exists only to provide Raman gain to the pump light for a first Raman pump 20A, but not for the signal.² It is an object in Stentz for the second order Raman pump 20B to not provide Raman gain to a signal band.³ Thus, Stentz does not disclose using both pump sources 20A and 20B to expand the amplification band, but rather one pump to provide gain to an optical signal in a signal band and the other pump to provide a gain outside of the signal bandwidth so as to provide a gain for the pumping light, but not the signal.

New Claim 7 is directed toward an apparatus for expanding the gain wavelength band of a Raman pump source by adding different Raman pump wavelengths. Claim 7 recites "...said first pump source and said second pump source configured to produce a Raman gain having a predetermined amplification bandwidth in a gain medium" Stentz does not disclose this element because the second order Raman pump of Stentz provides gain to the first pump and does not expand the gain wavelength band. Moreover, the goal of using the second pump source in Stentz is to not provide Raman gain to a signal band.

Claim 7 also recites "...a third pump source configured to provide pump light at a third central wavelength that is between said first and second central wavelengths...." This element provides a significant advantage in maintaining gain flatness in expanding the Raman gain wavelength band. This element is not disclosed or suggested by Stentz. Stentz

¹ Stentz, col. 3, lines 55-56.

² Stentz, col. 3, lines 55-58.

³ Stentz, col. 4, lines 64-67.

only discloses using two pump sources. Claim 7 recites how four pump sources operate to form a Raman amplifier and how the wavelengths of the pump source are arranged.

The Office Action states that “the use of a second wavelength band reduces nonlinearities in the amplification process and, as such, inherently allows for expansion of the gain bandwidth.”⁴ The Office Action does not provide any support for this assertion. Reduction of nonlinearities does not allow for expansion of the gain bandwidth. Stentz discloses that the second order Raman pump provides little gain to signals and provides substantial gain to the first pump in the beginning of the transmission span.⁵ Stentz discloses that the advantage of the second order pump is that it provides little Raman gain to the signals and therefore adds little noise to the signal. Instead the second pump source provides a substantial gain to the first order pump, which causes reduced optical nonlinearities.⁶ Thus, Stentz does not disclose a second order Raman pump that could provide sufficient gain to expand the amplification bandwidth while maintaining a flat gain profile.

In view of the above noted distinctions, Applicants respectfully submit that new Claim 7 patentably distinguishes over Stentz.

New Claims 8 and 9 recite language similar to that of Claim 7 and should be allowed for the reasons given above. In addition to the reasons already given, Stentz fails to disclose “...light from said first pump source and said second pump source being applied to a gain medium to produce a Raman gain having a predetermined gain deviation within a predetermined amplification bandwidth...” as is recited in amended Claim 8. Stentz also fails to disclose “...a third pump source configured to provide pump light at a third central wavelength between said first and second central wavelengths such that the first, second and third central wavelengths are substantially equidistant apart” as is recited in Claim 9.

⁴ Office Action, page 3.

⁵ Stentz, col. 4 line 64 to col. 5 line 5.

⁶ Stentz, col. 4 line 64 to col. 5 line 10.

Therefore, Applicants respectfully submit that amended Claims 8 and 9 patentably distinguish over Stentz.

Turning now to the rejection of Claims 4-6 (now replaced by Claims 10-12) as being obvious over the combination of Stentz and Kerfoot, Applicants respectfully submit that the Office Action fails to provide a *prima facie* case of obviousness by asserting prior art that does not teach every element of new Claims 10-12.

To establish a *prima facie* case of obviousness, M.P.E.P. §2143 requires that three criteria must be met. First there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine the references teachings. Second, there must a reasonable expectation of success. Finally, the prior art references must teach or suggest all the claim elements.

Turning now to the rejection of Claim 10, Applicants respectfully submit that the combination of Stentz and Kerfoot fails to disclose all the elements of Claim 10. Claim 10 recites "...said first pump source and said second pump source configured to produce a Raman gain at C-band in a gain medium...said third pump source and said fourth pump source configured to produce Raman gain having amplification in a L-band in the gain medium." Kerfoot only discloses pumping the C+L band with two Raman sources.⁷ Kerfoot does not disclose two pumping light sources for both the C-band and the L-band. Applicants respectfully submit that using more than one pump source for both the C-band and the L-band is not an obvious variation. The configuration of the pump sources recited in Claim 10 lead to gain flattening (e.g., prevention of ripple in the gain profile) in multi-wavelength Raman pumping.

⁷ Kerfoot, col. 3, lines 15-24.

Claim 10 also recites "...a fifth pump source configured to provide a pump light at a central wavelength that is between the first and second central wavelengths." Kerfoot does not disclose the use of a fifth pump source, nor does it disclose that the central wavelength of a fifth pump source is between the central wavelengths of the first and second pump lights. The use of the fifth pump source provides a significant advantage in maintaining gain flatness when the C-band and the L-band are simultaneously amplified.

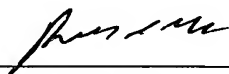
In view of the above noted distinction, Applicants respectfully submit that Claim 10 patentably distinguishes over Stentz in view of Kerfoot.

Claims 11 and 12 recite language that is similar to Claim 10. For at least the reasons given for Claim 10, Applicants respectfully submit that Claims 11 and 12 patentably distinguish over Stentz in view of Kerfoot.

Consequently, in view of the above comments, it is respectfully submitted that the outstanding rejection is traversed and that the pending claims are in condition for allowance. An early and favorable action to that effect is respectfully requested.

Respectfully submitted,

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OCT 08 2004

DETAILED ACTION

Election/Restrictions

Claim 5-10 are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected inventions, there being no allowable generic or linking claim. Applicant timely traversed the restriction (election) requirement in Paper No. 9.

Applicant's election with traverse of Invention I in Paper No. 9 is acknowledged. The traversal is on the ground(s) that (1) the claim grouping is incorrect and (2) examination can be made without serious burden. This is not found persuasive because: (1) the grouping of claims is correct, claims 1-4 are directed to an invention involving the wavelengths of the pump source and claims 5-10 are directed to an invention involving expansion of the wavelength band: and (2) the subcombinations are distinct invention which are separately useable. The inventions are classified in the same subclass however they still require the burden of searching for and applying alternative references to the distinct inventions.

The requirement is still deemed proper and is therefore made **FINAL.**

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-4 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.